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BASAL CANKERS OF EUCALYPTUS SPP.

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Eucalyptus spp. are receiving attention worldwide as valuable resources for a variety of wood products including fuelwood-biomass (4, 5, 10, 11). In Florida, some 4,000-plus hectares (ca. 10,000 acres) of commercial eucalyptus plantations (primarily E. grandis W. Hill ex Maiden and E. robusta J. E. Smith) have been established over the past 10-12 years. Current annual nursery production of seedling eucalyptus in the state exceeds 1,000,000 seedlings (ca. 1,500 acres of planting stock). Little is known regarding the pathology of Eucalyptus spp., particularly where they are planted as "exotics" (i.e., outside their native range). However, as interest in management of Eucalyptus spp. increases, diseases affecting these fast-growing trees are likely to become increasingly important.

Basal cankers of Eucalpytus spp., caused by the fungus Cryphonectria cubensis (Bruner) Hodges, comb. nov. (= Diaporthe cubensis Bruner) (6), deserve the attention of foresters and others interested in eucalyptus culture as a disease with potentially serious consequences. Cankers caused by C. cubensis have been reported on Eucalyptus spp. in Cuba, Surinam, Brazil, Puerto Rico, Hawaii, and Florida (1, 2, 7, 8, 9). Losses (mortality) in Brazil and Surinam have reached levels of 30 and 50%, respectively, in some young plantations (1, 9). In addition, "coppice regeneration" (allowing cut stumps to resprout following harvest), a preferred silvicultural system for Eucalyptus spp., has been significantly reduced by C. cubensis infections in Brazil (8, 9). Basal cankers may also render infected trees more susceptible to wind breakage (9).

To date, damage from C. cubensis basal cankers in Florida's eucalyptus plantations has not been considered serious. However, systematic evaluations are lacking, especially in regard to the possible role of C. cubensis in coppice regeneration failure—a very real problem in E. grandis plantations. A recent survey in one E. grandis plantation in south Florida revealed an increase in canker incidence from 14.6% in 1976 (7) to more than 50% in 1980 (authors - unpublished). This situation is substantially complicated by the frequent isolation of other potential canker-causing fungi (including among others an apparent Botryosphaeria sp. and an apparent Eutypella sp.) along with C. cubensis from putative "C. cubensis cankers" (authors-unpublished).

Fig. 1. Symptoms and signs of basal canker infections caused by C. cubensis on Eucalyptug grandis in south Florida. Al Canker margin showing demarcation between necrotic and healthy inner bark tissue. B-D) Progressive stages of canker development. E) Callus formation at the periphery of an advanced stage canker. F) Pycnidia of C. cubensis. (DPI Photo #702075 & 701687-9)

SYMPTOMS AND CANKER DEVELOPMENT. Cankers are first visible at the base of trees less than 2 years old. Initial symptoms include varying degrees of bark cracking (Fig. 1-B), basal swelling, sunken areas (depressions) in the bark, and bark discoloration. Removal of the outer bark at the canker margin reveals a distinct line of demarcation between healthy and necrotic inner bark tissues (Fig. 1-A). With time, bark fissures deepen and elongate, and the outer layers of the infected bark often slough off in a characteristic manner (Fig. 1-C, D). Sloughing is frequently enhanced by callus formation which results in basal swelling of infected trees. Distinct callus "folds" (Fig. 1-E) are readily visible on trees where infection results in death of the cambium. Varying degrees of orange to red-brown discoloration, often associated with exudates at canker loci, are common. Severe infections frequently result in discoloration (and presumably dysfunction) of the xylem behind canker faces. Basal cankers may extend a meter or more above the ground, and multiple cankers may develop if conditions are favorable. Cankers located at or near branch stubs higher on

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stems may also occur, although these are less common than those at tree bases. The incidence and severity of C. cubensis cankers are noticeably higher in environments characterized by moderate to warm temperatures and extended periods of heavy rainfall (1, 7, 9).

C. cubensis sporulates readily on the dead bark of infected trees producing both asexual (pycnidia, Fig. 1-F) and sexual (perithecia) fruiting bodies (1, 6, 7, 9). Pycnidia are usually superficial (i.e., not embedded in the host bark tissue) and produced singly, although clusters of from 2-5 are not uncommon as a result of the fusing together of pycnidial bases. Pycnidia are initially reddish brown in color and become nearly black with age except for the tip of the neck. They vary in shape from somewhat cylindrical to broadly pyriform, and dimensions range from 0.4 to 1.8 mm in height and from 0.2 to 0.8 mm in diameter at the base. Under conditions of warm temperatures and high relative humidity, pycnidiospores characteristically ooze from active pycnidia in yellow-orange cirrhi (tendril-like "spore horns"). Perithecia are similar to pycnidia, but they are black in color and their bases are embedded in the bark. They are also somewhat larger than pycnidia, measuring approximately 1.5 to 3.0 mm in diameter at the base with necks extending to 5 mm or more under moist conditions. Perithecia are produced in small clusters of from 2-6 or in long lines in bark fissures. While fruiting bodies are helpful diagnostic features, the similarity of fruiting bodies produced by other saprophytic and/or canker-causing fungi (e.g., Valsa- and/or Eutypella-like fungi, Diplodia spp., Botryosphaeria spp., etc.) render laboratory confirmation desirable.

SURVEY AND DETECTION. Look for tree bases that are swollen and/or discolored with varying degrees of bark cracking and sloughing. Close inspection of dead bark often reveals characteristic reddish brown to black fruiting bodies. "Bleeding" or exudation from affected tree bases may also be indicative of infection. Inner bark reveals a sharp line of demarcation between healthy and diseased tissues.

CONTROL. Practical control measures outside of good silvicultural management are unknown. Proper species-site selection and perhaps the production of resistant host genotypes through a program of tree improvement and resistance screening offer possibilities (3).

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